Technical Bulletin No. 11

EXAMPLE THERMAL CALCULATION PROCEDURE

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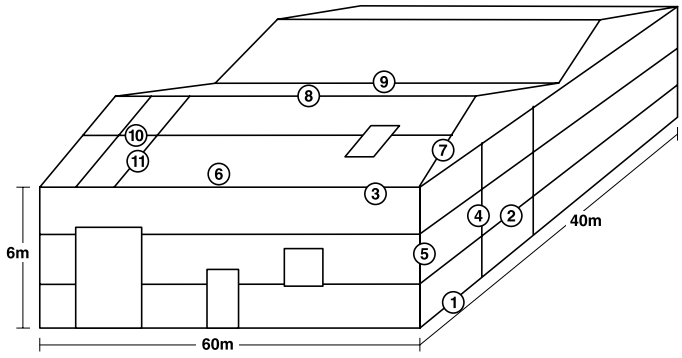
Following the recent Technical Bulletin No 10 concerning α values, this Technical Bulletin has been produced to provide additional explanation about the procedure needed to show compliance with the thermal transmission requirements of Approved Document L2. The building shown in fig. 24 of Technical Paper No. 14 has been used to demonstrate the calculation procedure.

Roof slope	**5°**
Personnel door	**1×2m**
Window	**1×1m**
Vehicle access door	**4×4m**
Rooflights 10% of roof area	



The permitted elemental U values are shown in Table 1 of ADL2. These define the allowable heat transmission through the various construction elements of the building.

By combining these values with the maximum permitted areas of the construction elements shown in Table 2 of ADL2, the maximum allowed heat loss from these elements in a building with the same size and shape as the actual building - the so-called notional building - can be calculated, as follows:

Plane element	Maximum area of opening %	Area m²	U-value W/m²K	A×U W/K
Total wall, including doors etc		1234		
Personnel doors & windows	15	185	2.2	407
Access door		16	0.7	11
Walls (- 15% & access door)		1033	0.35	362
Total roof, including rooflights		2409		
Rooflights	20	482	2.2	1060
Roof (- 20% rooflights)		1927	0.25	482
Ground floor		2400	0.25	600
			$\Sigma AU_{elemental}$ =	**2922**

The AD also allows an additional heat loss from the notional building to take thermal bridges at the various junctions between the construction elements into account. The allowed heat loss from individual junctions are not defined in the same “elemental” way, but instead the permitted heat loss from the notional building is simply increased by an amount equal to 0.1 of $\Sigma AU_{elemental}$, where the value 0.1 is the so-called alpha (α) value.

i.e. in this case the additional allowed heat loss $= 0.1 \times 2922$
$= 292$ W/°C

So the total allowed heat loss from the notional building $= 2922 + 292$
$= \underline{3214}$ W/°C

Therefore the total allowed heat loss from the **actual** building is also 3214 W/°C

The total heat loss from the actual building is calculated using the actual areas and U values of the construction elements (ΣAU), together with the Ψ values and lengths of all the thermal bridges ($\Sigma\Psi$L).

For the example building above:

Plane element	**Area m²**	**U-value W/m²K**	**A × U W/K**
Side walls	514.8	0.35	180.2
End walls	701.0	0.35	245.4
Access door	16.0	0.7	11.2
Personnel door	2.0	2.0	4.0
Window	1.0	2.0	2.0
Rooflights	240.9	2.2	530.0
Roof	2168.2	0.25	542.1
Ground floor	2400.0	0.25	600.0
		ΣAU = 2115	

Thermal Bridge	**Length m**	**Ψ-value W/mK**	**L × Ψ W/K**
① Ridge	120	0.01	1.2
② Eaves	120	0.25	30.0
③ Verge	80	0.10	8.0
④ Valley Gutter	60	1.50	90.0
⑤ Sill	195	0.41	80.0
⑥ Corner	24	0.25	6.0
⑦ Window or door head	6	1.50	9.0
⑧ Window or door jamb	14	1.50	21.0
⑨ Window sill	1	0.30	0.3
		$\Sigma\Psi$L = 246	

The total heat loss from the actual building $= \Sigma AU + \Sigma\Psi L$
$= 2115 + 246$
$= \underline{2361}$ W/°C

This is less than the allowed heat loss of 3214 W/°C, so the actual building will comply with the thermal transmittance loss requirement in ADL2.